



Dose Reconstruction

Savannah River Site

N E W S

Phase II: Source Term Calculation and Environmental Pathway Data Retrieval

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A Piece of the Grand Design: SRS Demographic Database and Geographic Information System

Phase II of the Savannah River Site (SRS) Environmental Dose Reconstruction Project, conducted by the *Radiological Assessments Corporation* under a contract with the Centers for Disease Control and Prevention, will develop a relational demographic database and a supporting Geographic Information System.

Demographic Database

For purposes of dose reconstruction modeling, information will be compiled for groups of people who may have been affected

The relational demographic database will link tables of information about human population in the SRS area.

by releases of chemicals and radionuclides from the SRS. Information dating back to the 1950s will be loaded into a relational demographic database. This database will divide the information into categories useful to the dose reconstruction project. These categories link different sets of data to construct a detailed description of the areas and populations potentially affected by releases from the site. Using the database, scientists can locate, sort, and retrieve information pertaining to population dynamics, agricultural practices, and human lifestyles in the SRS area.

The following categories include key data sets that will be collected:

- ♦ Population profiles and characteristics of the residents
- ♦ Food crops and farm animals in the region
- ♦ Water and local food sources
- ♦ Aerial photographs.

Scientists will use the demographic database to evaluate potential exposure pathways to humans, and to identify specific population characteristics which would most likely have resulted in exposure to contaminated foods.

Categories Of Information

While population and land use variables must be included to maximize usefulness of the database, it is important to avoid overloading the system with nonessential information. As a result, scientists must carefully consider which data will be needed

Categories will link sets of data to construct a profile of potentially affected areas and populations.

for analyses.

Key population attributes necessary to estimate dose (such as regional eating and drinking habits) will be evaluated and considered for addition to the database.

To understand exposures influenced by dietary habits, it is essential to know where food was grown and how much food was consumed. Data on releases of chemicals and radionuclides can identify specific exposure pathways that require careful consideration (such as the pathway iodine-131 travels from air to vegetation, to dairy cattle, to milk, and finally to humans).

Knowledge of a subpopulation's lifestyle may imply that a specific pathway should be examined. For example, researchers may need to evaluate subgroups such as fishermen who have consumed large quantities of fish from contaminated waters.

Categories of information will be divided into subcategories. For example, the category *ground cover type* may include subcategories such as water, forest, grassland, and wetland to describe the primary features of the land. Important data about these features, such as soils, land topography, and precipitation, are evaluated and added to the database.

The population characteristics linked to evaluating land use in the *ground cover type* category are density of the population, age structure of the residents, time spent out of doors, and other factors that might influence land use. This method establishes key elements in the database that influence exposures of people and the environment.

Geographic Information System

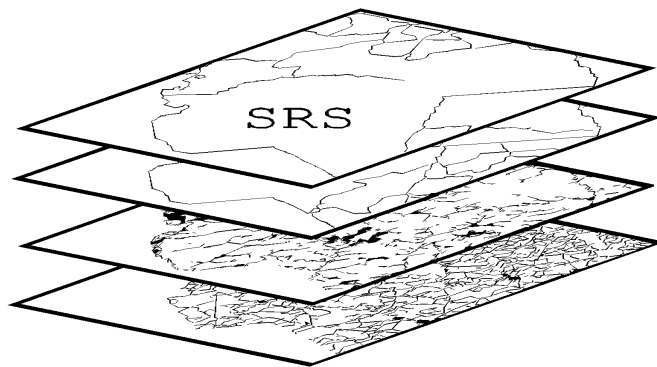
To manage these large quantities of data, scientists will use a Geographic Information System (GIS) to create and analyze maps of key information.

While a table of numbers can be confusing, a map uses symbols and colors to present the same information. For example, a map can clearly illustrate characteristics of a population such as age and sex.

But beyond simple mapping, researchers will use the GIS to organize, manage, and perform spatial queries and analyses of data. For example, using the GIS, scientists will be

able to identify pasture land within a 20-mile radius of the SRS and link this information with the kinds of animals grazing on the land.

Collecting Data



The Geographic Information System organizes mapped information and allows computerized comparisons and queries of the layers of data.

Radiological Assessments Corporation and South Carolina State University researchers will spend hundreds of hours collecting demographic and environmental data for the area surrounding the SRS. As the data are collected, information will be entered into the demographic database for use with the GIS.

Scientists are also currently examining site information previously compiled for the SRS. This information includes aerial photographs that date back to the beginning of site operation (used to evaluate land use and ground cover), a site-wide water table map; base maps computerized by the U.S. Forest Service at the SRS; and some existing GIS data for the site (including timber, contours, wells, soils, and streams). In addition, researchers have also identified two databases generated at the SRS that contain land use and population information about the site and surrounding areas.

Release Estimates Expected to Differ

Estimates of past releases from SRS facilities developed as part of Phase II of the Dose Reconstruction Project are expected to differ from past estimates made by SRS operators. One obvious difference will be that the Phase II estimates will include ranges of uncertainty, as well as best estimates of the releases. In the past, uncertainties in release estimates were generally not included in reports of liquid and airborne releases from site facilities.

Phase II estimates will include an estimated range of uncertainty, as well as best estimates of the releases.

The estimates produced by the Phase II study may also differ from those quoted in previous reports. The analysis of releases will investigate possible biases in past sampling and measurement procedures, such as problems with monitoring devices. If biases existed, then an estimate of the bias will be used to correct previously reported results. Estimates of bias will necessarily be uncertain, and this uncertainty will be reflected in the results.

The Dose Reconstruction Project will also investigate possible releases during periods when effluents were not sampled. The method used to estimate a release will depend on whether the release was airborne or liquid, where the release originated, and the length of time for which measurements were not available. Brief data gaps, resulting from temporary failures of sampling equipment, may be filled by interpolating release rates measured before and after the gaps. Even this simple procedure adds uncertainty to the total release estimate.

Calculations that link release rates to production rates or operating history may be used to make estimates of releases during other periods. In some cases, process models may be used to estimate the releases. Whenever Phase II release estimates are made, the inherent uncertainties will also be evaluated and included as part of the chemical and radiological source terms.

An Open, Public Process

Public input is critical to this project. Researchers encourage your input and attendance at public meetings to stay informed on the progress of the research. Public meetings will be held in the areas surrounding the SRS and will be announced in each newsletter.

The Centers for Disease Control and Prevention and *Radiological Assessments Corporation* and South Carolina State University scientists will provide clear and accessible information to the public. Newsletters and fact sheets will be published regularly to provide updates on the progress of the research. Detailed technical information, including copies of the Phase I database describing research material discovered through June 1995, is available upon request.

An address for inquiries and comments is located on the outside cover of this newsletter. Individuals with information related to the study are encouraged to call the SRS Dose Reconstruction Project toll-free telephone number, 800-637-4766.



PUBLIC WORKSHOP

Savannah River Site

Environmental Dose Reconstruction Project

conducted by The National Center for Environmental Health, Centers for Disease Control and Prevention, and *Radiological Assessments Corporation*

Monday, April 15, 1996 • 7:00 - 9:00 pm

Holiday Inn Oceanfront

1 South Forest Beach Drive, Hilton Head, SC

The Savannah River Site (SRS) Dose Reconstruction Project supports research that evaluates past releases of radioactive materials and chemicals from the SRS to the surrounding environment. The project has already undergone a first phase, which involved searching the site to identify and retrieve important documents. Phase II will use this information to calculate chemical and radiological source terms and determine intake pathways (eating, drinking, and inhalation) for people who have lived in the SRS area. This workshop will focus on the information being collected to support the reconstruction past doses to the public. Individuals with information of possible value to the study are encouraged to attend.

Workshops are open to the public for observation and comment, limited by space available. The meeting rooms will accommodate approximately 50 people. Parking fees will be waived for those attending public workshops.

For more information, contact Mr. Paul Renard, Centers for Disease Control and Prevention, 4770 Buford Highway, NE (MS F35), Atlanta, GA 30341-3724, Phone: 770-488-7040 or Fax: 770-488-7044

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